

[0011] In yet another embodiment, selecting one or more user equipments from the multiple user equipments for collection of participatory sensing data, based on multiple utility values obtained for the multiple user equipments further comprises one of the following operations: comparing each of the multiple utility values with a predetermined threshold; and sorting the multiple utility values.

[0012] In yet another embodiment, the method further comprises: after selecting user equipments that will participate in sensing data collection, notifying the user equipments to perform the sensing data collection; and receiving and storing sensing data that are collected by the user equipment within the predetermined area.

[0013] In yet another embodiment, execution of the method is triggered by an event, a cycle or a request.

[0014] In yet another embodiment, the utility value is obtained with a formula as below:

$$U_{\alpha} = \sum_{L_i} \int_{t=0}^{\Delta T} p'_{L_i}(\alpha) |C_{L_i}^{\alpha} - A_{L_i}^{\alpha}| dt$$

[0015] where U_{α} denotes the utility value of user equipment α ; L_i denotes the i -th subarea; ΔT denotes a cycle for selecting user equipments to participate in the sensing data collection; $p'_{L_i}(\alpha)$ denotes a probability that the user equipment α is located in the subarea L_i at a predetermined time t ; $C_{L_i}^{\alpha}$ denotes a set of the types of sensing data that can be provided by the user equipment α in the subarea L_i ; $A_{L_i}^{\alpha}$ denotes a set of the types of sensing data that are recorded in the subarea L_i and are not expired at the predetermined time t .

[0016] In any of the above embodiments, the sensing data comprise sensing data that are collected by the user equipment and relate to at least one type of humidity, temperature, air quality, location, brightness, vibration, sound and scene of the respective subareas.

[0017] According to another exemplary embodiment of the present invention, there is provided a method. The method comprises sending location information of a user equipment so that probabilities that the user equipment is located in respective subareas of a predetermined area at a predetermined time are calculated by using historical movement information formed from the location information. The method further comprises sending capability information of the user equipment for collecting sensing data so that types of sensing data to be collected when the user equipment is located in the respective subareas are determined. In addition, the method comprises receiving a notification about selecting the user equipment to participate in sensing data collection in the predetermined area. Further, the method comprises participating in the sensing data collection in the predetermined area in response to receipt of the notification, wherein the selecting is based on a utility value of the user equipment associated with the sensing data collection within the predetermined area, and the utility value is obtained based on the probabilities calculated for the respective subareas and the determined types of sensing data.

[0018] According to yet another exemplary embodiment of the present invention, there is provided an apparatus. The apparatus comprises at least one processor and at least one memory containing computer program code. The processor and the memory are configured to, with the processor, cause the apparatus to at least execute, for each of multiple user

equipments, calculating probabilities that the user equipment is located in respective subareas of a predetermined area at a predetermined time by using historical movement information of the user equipment. The processor and the memory are further configured to, with the processor, cause the apparatus to at least execute, for each of multiple user equipments, determining types of sensing data to be collected when the user equipment is located in the respective subareas, based on capability information of the user equipment for collecting sensing data. In addition, the processor and the memory are further configured to, with the processor, cause the apparatus to at least execute, for each of multiple user equipments, obtaining a utility value of the user equipment associated with sensing data collection within the predetermined area, based on the probabilities calculated for the respective subareas and the determined types of sensing data. Further, the processor and the memory are further configured to, with the processor, cause the apparatus to select one or more user equipments from the multiple user equipments for collection of participatory sensing data, based on multiple utility values obtained for the multiple user equipments.

[0019] According to yet another exemplary embodiment of the present invention, there is provided an apparatus. The apparatus comprises at least one processor and at least one memory containing computer program code, the processor and the memory configured to, with the processor, cause the apparatus to at least execute sending location information of a user equipment so that probabilities that the user equipment is located in respective subareas of a predetermined area at a predetermined time are calculated by using historical movement information formed from the location information. The processor and the memory are configured to, with the processor, cause the apparatus to at least execute sending capability information of the user equipment for collecting sensing data so that types of sensing data to be collected when the user equipment is located in the respective subareas are determined. In addition, the processor and the memory are configured to, with the processor, cause the apparatus to at least execute receiving a notification about selecting the user equipment to participate in sensing data collection in the predetermined area. Further, the processor and the memory are configured to, with the processor, cause the apparatus to at least execute participating in the sensing data collection in the predetermined area in response to receipt of the notification, wherein the selecting is based on a utility value of the user equipment associated with the sensing data collection within the predetermined area, and the utility value is obtained based on the probabilities calculated for the respective subareas and the determined types of sensing data.

[0020] According to yet another exemplary embodiment of the present invention, there is provided an apparatus. The apparatus comprises the following devices configured to execute operations for each of multiple user equipments: a calculating device configured to calculate probabilities that the user equipment is located in respective subareas of a predetermined area at a predetermined time by using historical movement information of the user equipment; a determining device configured to determine types of sensing data to be collected when the user equipment is located in the respective subareas, based on capability information of the user equipment for collecting sensing data; and an obtaining device configured to obtain a utility value of the user equipment associated with sensing data collection within the predetermined area, based on the probabilities calculated for the